GREAT LAKES CHAPTER

North American Rock Garden Society (NARGS)

SPRING NEWSLETTER, APRIL 2011

CALENDAR OF CHAPTER MEETINGS **meeting details below**

****SATURDAY, APRIL 23:**	**SPRING MEETING**
MEETING:	**10:30 AM – ca. 2:30 PM**
PLACE:	**Hamburg Senior Community Center** – see map insert
PROGRAM:	**10:30 AM – brief business meeting**
	11:00 AM Chris Chadwell
	Beautiful Alpines of Kashmir
	12:30 PM – CATERED LUNCH
	1:30 PM Chris Chadwell
	Growing Himalayan Rock Garden Plants

****SATURDAY, MAY 14:**	**SPRING GARDEN TOUR AND PLANT SALE**
MEETING:	**10:30 AM – ca. 3:30 PM**
PLACE:	**Broken Silo Nursery, John & Lea Ann Hargrove** – see map insert
	10:30-ca. 1:00 see the gardens and nursery
BAG LUNCH:	**While touring gardens and nursery**
PLANT SALE:	**1:30 PM**

Our Fall Meeting and Plant Sale will be at **Patrick & Bonnie Ion's** Garden in Ann Arbor, but we will announce the date and time in the fall newsletter.

UPCOMING NATIONAL MEETING:

The Fells Chapter presents the 2011 NARGS Conference June 17-19, 2011, with post conference trip options June 20.

This is a great time of year to see the New England Mountains, and it is so close. See: http://fellschapter.wordpress.com/about/ for more information. The meeting venue will be at Colby-Sawyer College in the quaint New England town of New London located in New Hampshire's scenic Lake Sunapee Region. Go to the NARGS website to Register. Besides lovely New England gardens, there will be field trips to local bogs and fens full unusual plants, as well post conference trips to Garden in the Woods (very much worth seeing) and Mount Washington.

From the Chair

Seems this winter was longer than most, at least to me. The nights were colder, a lot more snow to shovel, and too many of our friends and families are still struggling with this economy. That was enough to put me in a sad mood. Saddest of all was the passing of Fred Case. We miss you Fred.

Winter's over! Yeah! It's spring!!! That time of year when thoughts are filled with the visions of hepaticas blooming…..

Since it was a tougher winter, some of us may have lost more plants then normal from our gardens. To replace these losses please be generous. Pot up lots of plants from your gardens for our Spring Plant Sale (this year at Broken Silo Nursery). Not only will you help out our chapters finances but you also help our members restore some of their garden losses. Also, please be generous with the size of the plants you pot up. Remember the plants that look the best, sell the best.

When looking for other plant material for your garden please support those that have supported us, like Bob and Brigitta from Arrowhead Alpines, the Hargrove's from Broken Silo Nursery, Gary from Gee Farms, Esther from Benedict's Nursery, and Harvey from Wrightman's Alpines to name just a few. We have already lost too many fine nurseries. We must support those that have survived.

Remember for the April meeting we will have a catered lunch for everyone between the two talks by Chris Chadwell. Should be a great meeting so hope to see you all there!

John Serowicz

The February 19, 2011 **Second Annual Propagation Workshop** was held again at Arrowhead Alpines. We covered some of the same material as last year so I won't give a full report on it. Last year's newsletter had all the notes from that workshop. If you would like a copy of the hand-outs from this year's workshop please contact Laura Serowicz.

This year we covered a lot of methods for propagating plants: 1) Don LaFond talked about growing from seed 2) Esther Benedict explained how she uses sterile media to tissue culture plants and seeds at home and introducing us to a new hydroponic foam product (SteadyGROWpro) that she has had success with for growing on deflasked seedlings and sowing difficult seeds. Esther arranged with SteadyGrow to have sample kits of the foam product that all the participants could try it at home 3) Dawn Langdon-Paff showed how they do cuttings at Arrowhead Alpines 4) Rimmer deVries talked on how he does cuttings at home & 5) Andy Duvall demonstrated how to do grafting.

Everyone then had a chance to try their hand at grafting. Conifer understock donated by Gee Farms, Japanese Maple and Ginkgo understock bought in for members by the chapter, and scions donated by Arrowhead Alpines, as well as scions brought by members from their own gardens.

After Care for Grafts: Keep them out of direct sun in a cool (55-65° F) humid location. To keep the air around the plants moist tent in clear/semi-transparent plastic, and once you see active scion growth reduce gradually over 3-4 weeks the temperature and humidity. Cut back about 1/3 of the understock leaves at that time, then cut back the understock another 1/3 when you transplant it into a bigger pot. If the scion is strong the final cut of the remaining understock leaves should be in the spring of the next year just before the scion comes into growth. So it doesn't girdle the plant remove the rubber band or parafilm once the graft is firmly established.

Why plants change their names: Rock Garden Plants, Woodland Plants, and Modern Biology

by Tony Reznicek Meeting Notes by Laura Serowicz

At the October 30, 2010 meeting Tony Reznicek explored with us "Why Plants Change Their Names: Rock Garden Plants, Woodland Plants and Modern Biology" a lecture discussing the elements of modern evolutionary biology generating the current change in some plant names. He joked that it is standard practice for Plant Systematists to change the names of plants as soon as they become familiar to people to keep us on our toes and if they didn't we'd decide that we didn't need those experts. To put modern systematic biology into perspective Tony gave us a little background as to how the science of plant systematics, the naming of plants and the understanding of their evolutionary relationships, has developed through time.

People have been naming plants since forever. Even as far back as the Neanderthals plants were used in burial ceremonies, and they must have had ways to identify them .With just a few plants to name you didn't have to be very scientific about it, but once you developed a large enough body of knowledge and were teaching, then you had to change. The monks in Renaissance Europe realized that they could teach students all year long if they pressed and dried plants while they were in flower and then taught students from those dried specimens in the winter. Thus dried herbarium specimens began in the 1400's and some of those are still in the herbarium at Florence Italy, one of the centers of the Renaissance. At that point collections were simply used as a reference for identification and not to study the plants.

By the 1700's things had developed to the point that there were extensive books about plants, almost all of which were written in Latin. At that time, still with a limited catalog of plants to name, the names evolved by laboriously describing the plants in Latin with a polynomial name encapsulating the name of the plant and the characteristics by which you told this plant apart from others. However, with the beginning of world explorations, samples of new plants were flooding in to Europe from all over the world and the more plants you have the more names and adjectives you need in your description to differentiate them. Soon the names became very long and the system became completely unwieldy.

Linnaeus realized that to grasp the natural world complex polynomial descriptions didn't work. He developed a hierarchical system for both animals and plants with large classes divided into smaller groups, using simple observable features such as with plants the number of stamens, stigmas and other simple things, creating the ultimate name as a binomial name with a genus and species. This was the beginning of the great era of describing and naming the flora of the world. The binomial system is how we have done it since 1753, as it is easy and straight forward.

Linnaeus continued the practice of collecting herbarium specimens amassing a lot of specimens which he used as a reference collection and research tool. The vast quantities of new plants discovered throughout the world necessitated the organization of systematics as a discipline with scientific procedures and rules to follow to name newly discovered things becoming much more than just a convenient filing system. This period was the dawn of the English garden books. Curtis's Botanical Magazine still being published today began in the late 1700's. From the beginning it followed Linnaeus' system and has maintained the quality of the illustrations, which were originally hand-colored copperplate engravings. It is one of the longest running serials and U of M library has a complete set. With this and other botanical works the Linnaean system of classification immediately had immense power over the naming of plants.

During the time of world exploration there were some remarkable finds. In eastern North America *Franklinia alatamaha* was found along the Altamaha River in Georgia in the late 1700's. It was observed and seeds, seedlings, and presumably plants, were collected from it by the Bartrams of Philadelphia, with no understanding of the consequences, until the early 1800's. They assumed that along the next river down there would be a lot more of it and "suddenly" that patch was no longer there. That location happened to be the only spot in the world for it. It has never been seen as a wild plant again and over-collection may have been cause for its demise. Fortunately they were able to get it into cultivation.

The Linnaean system based on correlating and describing the patterns and discontinuities of physical variations observed in organisms actually worked well but didn't explain what accounted for that variation nor how that variation was transmitted and all of this occurring before Darwin, Mendel, and before genetics was understood. Even Mendel's elementary and primitive genetic experiments were ignored for half a century and in all the classification after Linnaeus there was no unifying theory that could tie them together. With Mendel's concepts of inheriting natural variation and Darwin's concept that natural variation is affected by selective pressures to change the forms of plants the science of naming plants evolved.

The Linnaean system assumed species were constant in space and time so that we only needed one or a few samples to represent that species and herbaria only needed one specimen of everything (like a stamp collection) and did not need to represent the variations of a species. Descriptions were all written in Latin, so all educated people learned Latin. Even to this day, if you discover and name a new species of plant you have to provide a diagnosis or brief description of it in Latin in order to validate the name of the plant. This standardizes understanding the descriptions for all countries. You do not have to learn to translate all the world's languages and scripts, only Latin. Just think of trying to read a description of a Chinese plant if it was only written in Chinese.

Today we have a lot of tools available to help with identification. We use many characteristics instead of focusing on a few like Linnaeus. There are a lot of statistical and quantitative analyses we can use and numbers of specimens are used to describe the species with large herbaria now having millions of specimens. What has really driven the changes in our understanding of plant relationships are three crucial things. 1) In the past 2 ½ decades we have been able to directly access the genome of an organism, and we can now look right at the DNA to see what makes it tick. The DNA molecule is a ladder-like structure with variations in the cross members of complementary base pairs that hold the double helix together. The language of the genetic code based on the four chemical bases [abbreviated as A, C, G and T, with A always pairing with T and C with G] and variations in how they are bonded is what generates individual organisms. 2) However, genomes are gigantic, with millions of paired bases in the DNA. Until the development of complex mathematical techniques we could not analyze them. 3) Now that we have more computing power with laptops and desktop computers than was previously only available to the wealthiest government research lab even in the 1980's everyone can work with analyzing the millions of possible base pairs of all the species in the world that balloon to a virtually infinite size. The situation being compared to a game where every move you make opens paths for hundreds of additional possible moves and every one of those moves opens up possibilities for hundreds more and after many moves the possibilities could be in the gazillions. Even now computers cannot actually calculate to completeness all the astronomical numbers of possibilities. Mathematical techniques group the possibilities according to certain classes, look for parallel variation and try to summarize and contract the amount of variation that is explored. Even so, with all the species in the world you need powerful computers. Perhaps as computers evolve before this next decade is done we will be able to sequence the genomes of any organism we want on demand, and will be able to analyze hundreds of thousands of species of organisms and see how they all fit together into phylogenetic trees. Those three things have resulted in most of the changes we have in modern systematics.

In appearance, when you actually pull it out of the cell, extracted DNA is very uninspiring with (according to Tony), roughly the consistency of snot. There are various techniques for analyzing and comparing similarities in DNA. A common method, albeit with some faults, involves searching for short pieces of DNA that are unique to individual species, scoring them as 1's and 0's (presence/absence) and creating a 1-0 matrix. Postulating what may be considered primitive/original characteristics (sometimes using fossil records) and more advanced/later characteristics you can start linking organisms that share the advanced characters. Using a little bit of fancy math and complex mathematical algorithms you can generate a network diagram, a branching tree pattern (phylogenetic tree) that shows how organisms are most likely linked to each other, and forming the concept of a common ancestor and all of the descendants of that common ancestor giving a sense of evolutionary change. Using fossil records you can corroborate that these patterns are roughly correct [the phylogeny tree used in Tony's talk is on the Angiosperm Phylogeny Website at http://www.mobot.org/MOBOT/research/APweb/ and click on "Trees" at the top of the page.]

Botany teaches that flowering lowering plants are divided into Monocots and Dicots. Cycads and Conifers are primitive. Ferns are even more primitive and below that you get into the slime that covers your pots. Looking at the tree diagram you see the Ferns are primitive by following the fern branch all the way to the base, they are just after mosses and liverworts and so forth. Next are the few survivors from the great forests that were covering the world during the dinosaur era. Then, 60-80 million years ago, Cycads and lots of species of *Ginkgo* were all over the world as they were once one of the dominant trees, but now there are just a few survivors. A few scattered Cycads [Cycadales] are in the tropics, and *Ginkgo* [Ginkgoales] survives in eastern China on one mountain where there might still be a native stand of them, with all the rest only as cultivated stock. Pines, spruce and other conifers [Pinales] fared better, there are still large areas dominated by conifers. Primitive seed-bearing plants [Gnetales] that look a little more like flowering plants, have not fared very well, there are a few *Ephedra* out in the deserts, the famous *Welwitschia* in South Africa and a few *Gnetum* in the tropics. In reality almost everything that bears seeds is an Angiosperm (a flowering plant) and they have been so tremendously successful.

Everybody always knew that *Magnolias* and their allies were primitive, they had fossils of Magnolia-like things going back into the dinosaur era and at the end of the Cretaceous era the later dinosaurs actually ate Magnolias and were living in a flowering plant flora. The traditional view was that all primitive plants were woody because woody plants fossilize more easily. Turns out there are also a lot of these primitive plants that were not woody so the new term for them is "Paleoherbs". So, in additional to the Magnoliids there were also these primitive herbaceous plants as well as woody ones and all of these predate the split between monocots and dicots. This represents a huge change in our thinking about the ancestors of flowering plants.

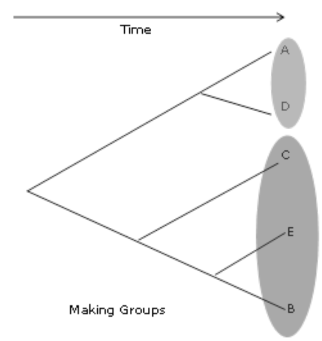
Up to this point, things corresponded with the traditional view taught in school, but looking at the phylogeny tree a little further some surprises show up. There are Monocots, but what we used to call Dicots are actually two different groups. One is a small group of plants, the "ANITA" group [**A**mborellaceae, **N**ymphaeaceae (Water lilies), **I**lliciaceae (Star Anise), **T**rimeniaceae (old-world tropicals), and **A**ustrobaileyaceae (Australia/New Guinea tropicals), all descended from ancestors that predated the split between Monocots and Dicots.

The most primitive branch of the "ANITA" group is Amborellaceae which has a single species, *Amborella trichopoda*, growing in the tropical forests of New Caledonia, the most primitive flowering plant known as yet, but some botanists think that possibly with a further looking at odd, unplaced, and poorly known plants from the tropics might turn up an even more primitive one. *Amborella* is a far cry from what people thought was primitive only 15-20 years ago, then thought to be small bushy woody plants with big floppy flowers and a dinosaurian look. Such plants were indeed there, but there was much more diversity and it is very possible that the most primitive things looked very different. With its small flowers, *Amborella* is certainly nothing like the Magnolias. Nymphaeaceae (Water lilies) include *Nymphaea*. The odd thing about this group is that botanists always knew there was something strange about them, but did not understand the significance of things like petal number. For one example, everyone was taught that monocots have flower parts in threes and dicots generally have flower parts in fours and fives. The word "generally" was used because there were a few of these annoying dicots that had their flower parts predominantly in threes such as *Schisandra, Nymphaea, Magnolia, Decaisnea* (in the Lardizabalaceae family), and *Asimina* (Pawpaw)..Illiciaceae include *Schisandra chinensis* that we can grow in Ann Arbor and Star Anise (*Illicium verum*; Zone 8). Trimeniaceae are old-world tropicals. The Austrobaileyaceae are mostly from the Southern hemisphere.

Wild Ginger, *Asarum* and its relative *Saruma henryi* are "Paleoherbs" with flower parts in threes like monocots but have other characteristics of dicots, such as two seed leaves, leaf venation, pollen structure, etc. Early botanists missed the clues that showed that these plants were different. Genetic evidence is very clear that these evolved before the split. *Chloranthus henryi* is also a "Paleoherb" in that it has one of the weirdest looking flowers (with parts arrayed in threes). It is part of the Chloranthaceae family which is tropical everywhere except in China and Japan where a few species range into the temperate zone. Tony has a couple different species of *Chloranthus* that set seed every year, which he sends into the NARGS Seed Exchange.

Even the monocots have a new twist. We thought that the most primitive monocots were things that looked a little like dicots with three petals like *Sagittaria* and *Alisma* [Alismataceae] a group which contains many aquatic plants. However, it turns out the most primitive monocot is *Acorus* the Sweet Flag [Acoraceae] used in medieval times in "rooms strewn with flags" (laid on the floor so they would release their fragrance as they were walked on). *Acorus* has a superficial resemblance to, but is not an Aroid, (a member of the Jack-in-the-pulpit family) and is much more primitive. Botanists have long documented the fact that this was weird and did not fit into the Aroids but they did not understand the significance of its differences.

We have learned some really interesting things, developed some new reasons to grow odd-ball plants, and that has made quite a difference in our understanding of the relationships of plants. There is still a lot of work to do as can be seen by the number of "Unplaced" listings on the phylogenetic tree [see tree on APG website above] before everything is laid out firm and in full. Even from when Tony did the slide for this talk a couple years ago to the current tree on the APG website there has been several changes made. So that is the main large-scale backbone of the changes happening in plant systematics but what really concerns us as gardeners more is when plants change their names and/or families. It happens mainly because we can now understand with much more skill the actual relationships of plants.



Tony gave us a small classification lesson using a simple tree with two main branches originating from a common ancestor. Off of one branch are A and D, off of the other branch are C, E and B. Let's say we are grouping them by habitat and that A and D are woodland plants, E and B grow in the open, but C diverged from E and B and also went back into the woods. If you look just looked at superficial features such as the habitat, what would happen is that you might think that C is closely related to A and D because they all occur in the woods, therefore they probably all have things woodland plants have to have such as broad leaves for catching more light, etc. By understanding where the branching link up (in this case A and B split before C branched off from B) we can avoid being fooled by superficial resemblance. That is what is generating some of the bumpy parts that result in name changes now that we have a better understanding of their evolution. If you were to actually lump C, which is descended from a different lineage, in with A and D, the group you would form botanists call Polyphyletic (meaning "from multiple ancestors") and that is a no-no in modern systematics.

As another example, using the same diagram, if you split E into a group, like a genus (with a unique feature), and grouped C and B into another genus that is also bad, because E is nested inside the other two, it is derived from the same ancestor as C and B. If you start splitting those out then the group becomes arbitrary, meaning that you don't have any more uniform rules for forming groups and the groups cannot be predicted from the diagram with consequences. If, for example, you are going to use these groups to do something like predict biochemical relationships, or whether they might have the same compounds for medicinal use or other kinds of economical use, or whether they might show similar characteristics of resistance to insects or so forth. You can see that your predictions would be thrown off if your groups didn't include everything, because those characteristics would also show up in another group. We would call that group Paraphyletic (because it contains some but not all members descended from a common ancestor). These terms, as well as Monophyletic (meaning "from a common ancestor" and includes all descendants from that ancestor), are often seen in botanical texts and will probably soon creep into gardening books. The bottom line is that if a traditionally recognized group (like Aster or Anemone) does not all come out together in one spot when the phylogeny is reconstructed then there is a problem. Most botanists feel that what they need to do is fix that and rework the relationships until they do work back to a common ancestor.

The phylogenic tree for *Rhododendron* shows that what we used to call *Ledum* is right in the midst of all the Rhododendrons. In fact, people who worked with rhododendrons knew this because *Ledum* would cross with some species of *Rhododendron*, and now that the genetic evidence is so solid the names need to be changed on all *Ledum*. So *Ledum groenlandicum* is now *Rhododendron groenlandicum*. *Menziesia* is also found within the *Rhododendron* phylogeny and also has been crossed with *Rhododendron.* Our crowberry, *Empetrum*, now sits right in the middle of the Ericaceae phylogeny rather than in its own family of Empetraceae, it is just a wind-pollinated heath not insect-pollinated so it lost its petals since it didn't need them to attract insects. It looks just like a heath and its fruit tastes like a heath so everyone is happy with that change. The bottom line is that the genetic makeup [genotype] trumps the external appearance of the plant [phenotype], which makes sense as it is your genes that determine who you are related to, not your appearance.

Before we had access to the genetic code a lot of taxonomic decisions basically had to be made on appearance because that is all we had, that is the reason why so many names have changed. Not only are we now able to access the genes but we have the capability of translating that access into information about relationships. That has caused some major revisions to a few groups such as with the Asters. If you do detailed molecular phylogenies of the group of plants surrounding Asters you will see that the traditional Eastern North American Asters come out in various places along the tree which is a problem. You have two choices here in order to make a monophyletic group (a group that is all descended from one common ancestor and include all the descendants of that ancestor), which is what we would like. What you would have to do is lump everything into one big group or else split Aster up into smaller common groups, of course splitting Aster up (which many Botanists refer to the "Aster Disaster") is what they had to do. So the next version of the Michigan Flora you're not going to have *Aster*, but also mostly *Symphyotrichum* with also *Eurybia*, *Oclemena*, *Canadanthus, Doellingeria,* and *Sericocarpus* [Flora of North America also follows this splitting up]. True *Asters* are actually Old-World/Eurasian with one Arctic-alpine species native to North America. Another nasty change is to our shooting stars, *Dodecatheon*, now seen as highly-derived *Primulas* that have evolved buzz-pollinated flowers for bees, but they evidently were derived from American *Primulas* relatively recently. [A few of the species use different names when changed to *Primula* as those species names were already used for other *Primula* species. New names are listed as synonyms in the Flora of North America.]

Actually not all the changes are bad. For example, we can look at the genetics of some of the classic disjuncts between Eastern North America and Asia and start to understand when it happened, how long they have been separated, and so forth. For example, the American *Liriodendron tulipifera* and Asian *L. chinense* are so closely related that they will hybridize with each other and we can see that they are closely related because nothing else looks like a tulip tree. With big-leaf Magnolias, one of the most interesting things is that even though they all look alike when you look at the genetics *M. macrophylla* has nothing to do with all the other big-leaf Magnolias. It is related to Mexican species. But our other native big-leaf Magnolias, *M. tripetala*, *M. fraseri*, etc. are very close relatives of the big-leaf species in Asia. It is remarkable and seems almost unbelievable but long before the article that came out with genetic evidence for this, Tony visited Phil Savage, the Magnolia breeder in Bloomfield Hills, to look at and talk about the Magnolias. Phil told him that *M. macrophylla* was weird because it would not cross with any other Magnolias except with extreme difficulty and it was obviously very isolated genetically. So in many cases we knew about these puzzles except that we couldn't really understand the significance of it. On the other hand, if you grow *M. tripetala* from the Appalachian and *M. officinalis* from sub-tropical China together you often can't even get pure seed because they hybridize so readily with each other. People have been hybridizing disjunct species for a long time. One of Phil Savage's big exploits was the breeding of yellow Magnolias, with most yellow Magnolias being derived from hybrids of American and Asian Magnolias that are closely related. With *Shortias* if you look at the phylogeny of the Diapensiaceae family you can see there are some distinctive primitive North American lines and a bunch of Asian ones, but the two closest relatives are the Japanese *Shortia uniflora* and the eastern North American *S. galacifolia*. One of the easiest to grow of all the *Shortias* is their hybrid, *S. ×intertexta* 'Leona' which from the phylogeny you could see that those two species were closely related despite that they were from opposite sides of the world. *Calycanthus floridus* and *C. sinensis* (or *Sinocalycanthus sinensis*) are another example of this. There were no *Calycanthus* known to occur outside of North America until the 1960's when *C. sinensis* was found in the mountains of eastern China as a very rare isolated plant. It turned out to be a great garden plant and the hybrids (such as *C. ×raulstonii* 'Hartledge Wine') are pretty spectacular too and grow like weeds.

With all this molecular technology we can now predict close relatives with more efficiency and it will be a big help to breeding programs. In particular we can probably make some good guesses on plants that are on opposite sides of the globe but might produce some interesting results. Ancient floras that are now separated because of climate change and other changes in the planet probably 20-25 million years ago were once joined in a band of similar vegetation across the northern part of the globe.

In the end, once we get over the bump of all those name changes, not only will there be a lot more plant genera but we'll actually be able to turn some of this information into some very practical uses, hybridizing being just one of them. Other things we can use that information for include studying the ecology and evolution of plants. With genetic knowledge you can look at dating, to figure out how long ago flowering plants evolved. Dating some of these past events with some precision is going to be another thing that we will be doing a lot more of in the future and this is really important for plants because many plants just don't fossilize (animal bones take a long time to rot and thus fossilize but plant fossils are rare). The name changes are just one minor bit of discomfort. Tony thinks once we get through a fairly thorough survey of the plant kingdom genetically we can actually look forward (after we get over the name changes) to much more stability in both names and relationships/family compositions.

Q & A for Tony Reznicek's Talk

***Cost to do DNA*?** Right now it is slightly under $1000, using small segments, which if you hit the right gene can be very informative. ***How long until all the names are settled down*?** Another 5-8 years. ***Estimated time of divergence of the Asian species from the North American ones*?** Basing it just on geological evidence most people figured 18-20 million years for most of those disjuncts, but genetically it is much more variable. Some of them were actually exchanging genes more recently so now the window looks like 11-20 million years, but long after continental drift occurred, so most of the evolution of flowering plants happened when the continents were already in place. ***What is going to happen to Hepaticas*?** Tony feels terrible about the name change for *Hepatica* as it was one of his students who was responsible for showing that it was nested deep within *Anemone*. One solution is to put everything in *Anemone*. The other is to rename *Anemone* into 4 or 5 different genera (actually done in some Floras), and if you do that, you can recognize *Pulsatilla*, *Hepatica* and about 4 or 5 other genera of the former *Anemone*. Those genera would somewhat match how the seeds look, for example, the little woodland Anemone with three bracts like *A. quinquefolia*, *A. nemorosa*, *A. ranunculoides* are one genus, another the wooly North American ones like *A. virginiana* and *A. multifida*, another the Japanese ones that bloom in the fall, and another with some from the Southern hemisphere. Usually people lump a genus all into a group if there is some distinctive unifying feature that makes them all recognizable as a unit, and they tend to split them apart without such a unifying thing. All *Euphorbia* have a unique floral structure that is very different from everything else, and even though there exist very distinctive groups within *Euphorbia* most people are very happy to keep them all together because they have a unifying feature that allows easy recognition. Tony reluctantly agreed that *Anemone* probably should be split, but there are some practical issues to consider here. Although it is easy to lump everything together, to split it apart is much harder because you have to know the whole group in great depth worldwide and the nomenclature can get difficult and messy too.

Tony has been busy working on (among other things) a new **Michigan Flora website** http://michiganflora.net/ that will have the up-to-date names (as well as keys and county level maps) of all vascular plants known to occur outside of cultivation in Michigan. Do take a look at it as it has some great information on the native (and alien) flora around us.

Plant Hybridizing

by Curt Hanson

Meeting Notes by Laura Serowicz

The January 22, 2011 meeting featured a talk by Curt Hanson of Crintonic Gardens in Gates Mills, Ohio. Curt is a well-known hybridizer of daylilies. Daylilies are easy to hybridize because the sexual parts are easy to see. Also insects rarely pollinate them and even if you don't tag your crosses you can pretty much be assured you have a controlled cross. He got into daylilies to make a living. Like all avid gardeners with many interests, his talk covered much more than just how he hybridizes daylilies. His soil is a nasty non-draining clay so there are a lot of things that he can't grow well even with the soil amended. He believes in growing things from seed, because even if you don't make the crosses yourself, there is always the chance that you will come up with something unique even from open pollinated seed.

Curt started his talk with photos of various cacti and succulents from some of his travels throughout the Southwest: including Texas, New Mexico, and California. His travels often involve finding rare, endemic species of some of the genera he is interested in. A species of oak, *Quercus hinkleyi*, was found only on a small mountain range in Texas growing out of shear limestone rock. He was unable to get seed of a couple other rare oaks in Big Bend National Park because during spring break the park was full and they wouldn't allow him to bring into the park his dog that is always with him. He has a huge collection of oaks from seed, mostly from arboretums that have large oak collections and the Oak Society seed exchange. From those he has made some selections that he has then tried to figure out their parentage (oaks are promiscuous so all kinds of crosses can happen).

Native gingers are another of Curt's interests. In the Southeastern US you see some of the sites where he found *Hexastylis* (syn. *Asarum*) growing. They are typically found in Appalachian woodlands and he got to the point where he could drive through the mountains and tell by the trees and the soil type the likelihood of finding the *Hexastylis*. When you are looking for a plant you develop a type of radar for them and they only seemed to be found on places that have been undisturbed. There are 8-10 species of *Hexastylis* found in the Southeastern US (references differ). *Hexastylis speciosa* has the biggest flowers. Since it is probably closely related to the Japanese species, it is probably the best hope for hybridizing with them. Cutting open the flower you see that the flower parts are similar to *Magnolia*, indicating that they evolved at the same time, back when dinosaurs were roaming the earth, thus being one of the Paleoherbs mentioned in Tony's talk in October. In the winter-time the evergreen foliage has colorful variegation and they are every bit as beautiful in the winter as the summer. You can't tell by the leaves which species they are, but only by dissecting the flowers can you key them. *H. heterophylla* is probably the most widespread species. In an attempt to hybridize his plants, Curt reaches into the flower tube with thread, wiggled it around to collect pollen then went to another flower with the thread and wiggled it around inside in the hope that the pollen would be transferred. He doesn't think he had any true hybrids resulting from his efforts; the seedlings he did have growing in a flat died before he could identify them. He doesn't think they will ever be a popular garden plant but, like Hellebores, they have a magic to them when you lift them up to view the flowers. You'll find in some populations some flowers have ruffling along the edges, sometimes they'll be almost pure white or pure black, with all kinds of spotting and the marbling on the leaves can be every bit as infinite. Curt thinks they do not hybridize in nature but he does think because of the variations he's seen that they are in some sort of speciation mode. *H. rhombiformis* is one of the rarest found only in a little river valley near Asheville, North Carolina. Often there will be 100's of individual plants there but it is endangered because of clear-cutting in the area. *H. minor* is listed as threatened because it grows in an area of rapid industrial development. *H. shuttleworthii* rivals *H. speciosa* in size. Cutting open the flower you see that the flower parts are similar to *Magnolia*, indicating that they evolved at the same time, back when dinosaurs were roaming the earth and being one of the Paleoherbs mentioned in Tony's talk in October. Sadly, at a time when Curt had all the various species and had started working on hybridizing them he got a fungus, probably from some soil that he brought in, and that wiped them all out in his garden.

Curt also likes to grow Japanese maples from seed harvested at a nursery with a big collection of them in a hoop house, all which have cross-pollinated amongst themselves. He looks for ones that have special leaf characters or interesting forms like pendulous habit or finely cut leaves.

A friend of Curt's, Tim Brotzman, who introduced *Cercis canadensis* 'Covey' (aka 'Lavender Twist') took a white-flowered form of *C. canadensis*, surrounded it with a grouping of *C. canadensis* 'Covey,' covering over them and letting some flies in to do the pollinating. From the resulting seeds he selected a white pendulous form which will be in nursery production next year. He let the flies do the work and selected the seedlings that looked promising. So sometimes you can encourage nature to do the crosses. Tim Brotzman is also responsible for many of the new Witch hazels (*Hamamelis*) that have been recently introduced. They are mostly hybrids of *H. japonica* and *H. mollis*, but he has been using *H. vernalis* introducing more of the red-flower color into the hybrids. When Curt was in the Ozarks last year he found one particular river basin with thousands of the most dynamic colors and forms of *H. vernalis* that he has ever seen so he plans to go back there this year and take some cuttings to bring back. They weren't much on flower size so Curt is hoping to be able to cross those cuttings with some he has with larger flowers and see what he gets.

Curt finds *Magnolia* are easy to hybridize since the pollen keeps when frozen. He cuts the top off of the flower about four days before it opens. Using a little camel hair brush he stirs the thawed pollen around inside the flower, and then ties the flower back shut to keep out little beetles, the main pollinators, of *Magnolia*. To see the results *Magnolia* take 10-15 years to bloom from seed, but in the last issue of Magnolia Society Journal Curt read that a gentleman in England was getting his seedlings to bloom in 3 years, so perhaps you can speed up the process. A *Magnolia* breeder in Wisconsin is breeding for hardiness using *M. acuminata* from Ontario.

Curt then showed us some photos from Oregon's Marietta O'Byrne, top *Helleborus* hybridizer. Marietta deals with wholesale nurseries selling thousands of the Hellebore hybrid seed strains. She carefully hand-pollinates her plants keeping the seedlings true to each strain, but she does not get to see most of her strains bloom as they go to the nurseries before they flower, and only holds some back for continuing the lines, picking out any that she thinks may be important for her breeding program. Curt has started making his own hybrids, but likes to use the deciduous species, such as *Helleborus atrorubens, H. torquatus,* and *H. croaticus*. He has taken them into the better hybrid color forms and now uses both evergreen and deciduous species for hybrids. The species work well in a wildflower garden, being daintier with generally more flowers on the stems, and look like they belong in nature. Curt has been selecting ones that have more black when they flush, and using *H. torquatus* for dark foliage. He's also started using *H. hercegovinus* for its finely dissected leaves which he is hoping will be passed on to better flowering hybrids.

Next Curt showed some interesting variegated leaves. Variegation is hard to hybridize for, since it tends to be found more as a sport on a plant. He grows a lot of *Arums* (and other aroids), including *A. dioscoridis* [as *v. smithii*], *A. italicum, A. concinnatum*, *A. nigrum* and many seedlings with a variety of leaf variegation. He lets nature do the hybridizing on them by just growing the forms next to each other and hoping they mingle, then sowing the seeds in flats in late fall. They germinate in early spring and he pulls out the ones that he thinks are special. They are nice to have in the garden when there are no other green leaves in late fall/early winter. Cyclamens are also great for their leaves which can vary greatly making it fun to try to choose a favorite. The fun thing about hybridizing plants, you can breed for what you like in a plant. Curt has tried pollinating *Epimedium* by hand but you need a magnifying glass and little tweezers, trying to find the pollen is difficult, and, although other hybridizers have done it, he doesn't recommend it. Curt lets nature do the work with the *Epimedium* and has had some really cool volunteer seedlings show up.

Hosta pollen also freezes well. To freeze the pollen he cuts anthers with fresh pollen, putting 5-6 of them in a little gel cap and storing them in a snap lid film canister with (or without) an anti-desiccant packet inside, and the canister labeled and thrown in the freezer. When he is ready to use it he just dumps the anthers out on a piece of paper and goes out to the garden with forceps to rub the pollen covered anthers onto the stigma of the flower in the garden. Some people put a piece of nylon stocking over the flower buds to keep the bees from getting at the new flowers first, but Curt just wakes up at dawn to try and beat the bees to the newly opened flowers. You can tell if a flower has already been visited by a bee by the mess they make of the pollen. He attaches little tags on the stems to know which pollen he used and has a record of the crosses he makes. Keeping records of crosses is important. Using the pollen from fall blooming species with spring blooming species, Curt is getting the big leaves of the fall bloomers with black petioles and a lot of variation in the flowers.

Curt showed us a lot of photos of the daylilies he hybridized, explaining what he looked for when making crosses, from flower form, colors, patterns, size, amount of blooms, bloom time, good leaves, etc. He flags certain plants through the season for different features and at the end of the season after collecting the seed he selects those that were flagged to grow on or to be used in more crosses the next year. He sows anywhere from 10 to 15 thousand seeds a year and grows them on for about 3-4 years once they are dug out of the seedling field. You have to ruthlessly critical of your seedlings and keep in mind what your goals were for the cross. Curt grows on seedlings like crops, in rows lined out by parentage, with separate rotating beds for seed starting, He selects for growing on about 1 out of a thousand of the seedlings. Sometimes you have to use your imagination when making crosses, trying to get certain features and realize that even though the plant doesn't quite match what you want perhaps it has something in its genes that will get you what you want within a few generations. Every cross Curt makes he has some goal in mind, otherwise he is just making a lot of useless work for himself.

Please send address changes to our Treasurer:

Please include your up-to-date email address

Susan Reznicek
890 Wickfield Court
Ann Arbor, Michigan 48105-1227
(734) 996-0692
reznicek@umich.edu

MEMBERSHIP INFORMATION:

Great Lakes Chapter:

Name:________________________________

Address:______________________________

____

Phone: ______________________________

email/FAX:____________________________

Send $10.00 per year (check payable to Chapter) to:
Susan Reznicek
Treasurer, Great Lakes Chapter, NARGS
890 Wickfield Court
Ann Arbor, Michigan 48105-1227
or pay in person at the next GLC meeting

National Organization:

Name:________________________________

Address:______________________________

____

Phone:_______________________________

email/FAX:____________________________

Send $30.00 dues (check payable to NARGS) to:
Bobby Ward
Executive Secretary
North American Rock Garden Society
P.O. Box 18604, Raleigh, NC 27619

We strongly encourage people to join both the Great Lakes Chapter, and the National Organization.

GREAT LAKES CHAPTER FIRST CLASS
North American Rock Garden Society
Newsletter Editor, Tony Reznicek
890 Wickfield Court
Ann Arbor, Michigan 48105-1227